Fritz Friedrichs: *Binary Systems. II. Ammonium Trinitride, Ammonia.*

Ammonium trinitride forms with ammonia three compounds containing, respectively, 1, 2 and 4 molecules of ammonia. All of these ammonates show metastable melting points. The inversion point of the diammonate into saturated solution of the anammonous salt is at — 8.5°, that of the tetrammonate into saturated solution of the diammonate is at — 71°, and the eutectic is at — 87° with a concentration of 75 per cent. NH_3. The remarkable circumstance that the first two of these ammonates $NH_4N_3 \cdot NH_3$ and $NH_4N_3 \cdot 2NH_3$ were never observed to exist together seems to point toward a tautomerism of hydronitric acid. It is not impossible then that the compound may under certain conditions have the older ring formula and under others the chain formula independently suggested by Angeli, Thiele and Turrentine.

Fritz Friedrichs: *Binary Systems. III. Ammonium Bromide, Ammonia.*

In extension of the work of Roozeboom, who studied a limited portion of this system, ammonates containing, respectively, 1, 3, 6, 9 and 18 molecules of ammonia were shown to exist and the boundaries of their fields were established. All of the three ammonates with the exception of the tri- and the octodecammonate possess metastable melting points. The stable melting points of the two just named were found at + 9.5° and — 79°, respectively. Inversion points were found for the transition of $NH_4Br \cdot NH_3$ into saturated solution of anammonous salt at + 36°, of $NH_4Br \cdot 3NH_3$ into saturated solution of $NH_4Br \cdot NH_3$ at + 6.5°, of $NH_4Br \cdot 6NH_3$ into saturated solution of $NH_4Br \cdot 3NH_3$ at — 69.5°, of $NH_4Br \cdot 9NH_3$ into saturated solution of $NH_4Br \cdot 6NH_3$ at — 72°. The zone of the saturated solution of the triammonate shows a pressure maximum of 1,600 mm. at + 4°.

As may be seen from the foregoing examples the ammonates are entirely analogous with the hydrates contrary to the recently expressed opinion of Fritz Ephraim (*Zeitschr. phys. Ch.*, 81: 539–542, 1913), who on the basis of an investigation upon the ammonates of certain metallic salts (all of which happened to be insoluble in liquid ammonia) believed that he had discovered a fundamental difference between ammonates and hydrates, since the former apparently showed no inversion points or definite fields of existence.

Charles James and E. H. Holden: *Sulphates of Yttrium.*

W. A. Noyes: *Nitro-Nitrogen Trichloride an Electromer of Ammono-Nitrogen Trichloride.*

Ordinary, or ammono-nitrogen trichloride hydrolyzes to ammonia and water. An attempt is being made to secure nitro-nitrogen trichloride, which should hydrolyze normally to nitrous acid and water. To prepare the compound a mixture of nitrosyl chloride, NOCl, and phosphorus pentachloride is passed through a porcelain tube heated to 1000°–1200° and containing a little platinum. A mixture of gases which can be condensed with a freezing mixture or by cooling with liquid air is obtained. The analyses indicate the presence of a trace of phosphorus oxychloride, a small amount of silicon tetrachloride, nitrosyl chloride, free chlorine and, in some cases, about ten per cent. of nitro-nitrogen trichloride.

C. L. Parsons,
Secretary

SOCIETIES AND ACADEMIES

THE AMERICAN PHILOSOPHICAL SOCIETY

Mr. Herbert E. Ives read a paper before the society on April 4, 1913, on "Illuminants—Present and Future." Modern illuminants are interesting as applications of radiation laws and the science of spectroscopy. The earlier illuminants, such as oil, the candle, the gas flame, the carbon filament electric lamp, are approximations to black-body radiation. Increased efficiency is with these dependent on the attainment of very high temperatures. More recent illuminants possess higher efficiency owing to selective radiation, in accordance with Kirchhof's law for selectively reflecting or transmitting bodies. Thereby their radiation is relatively more intense in the visible spectrum. This is the case in the Welsbach mantle and the tungsten filament. Another class of selective radiation is met in non-temperature or luminescent sources, where isolated spectrum lines or bands are the source of the light. The mercury vapor lamp falls in this class. The illuminants of the future will be marked by greater efficiency, which may be attained through selective radiation. Whether this will be brought about by the use of gaseous energy or electrical, or through little understood chemical processes such as the firefly exemplifies, is of course as yet unknown. Calculations show that if there were none of the present enormous losses in transforming the energy of coal into light something like 1,200 times as much light could be obtained for the same consumption.